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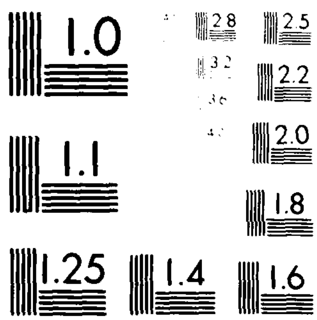

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SOME FEATURES OF DEEP STRUCTURE AND ORIGIN OF LOMONOSOV RIDGE ACCORDING TO AEROMAGNETIC DATA

by

A. M. Karasik, N. I. Gurevich, et al

FOREIGN TECHNOLOGY DIVISION

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FTD-ID(RS)T-0799-80

(12) 36

(11) 22 Aug 80

UNEDITED MACHINE TRANSLATION

(14) FTD-ID(RS)T-0799-80   22 August 1980

MICROFICHE NR: FTD-80-C-000984

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English pages: 34

(21) Unedited machine trans. of

Source: Geofizicheskiye Metody Razvedki v Arktike, [redacted] pp. 9-19, 1971.

Country of origin: (USSR)
This document is a machine translation.
Requester: Dept. of the Navy
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SOME FEATURES OF DEEP STRUCTURE AND ORIGIN OF LOMONOSOV RIDGE ACCORDING TO AEROMAGNETIC DATA.

A. M. Karasik, N. I. Gurevich, V. N. Masolov, V. G. Shchelovanov.

In recent years underwater ridge of Lomonosov in the Arctic Ocean, discovered by Soviet scientists in 1948. (Gakkel', 1954), it became the subject of the systematic geophysical studies, which include aeromagnetic photographing and seismic observations (Demenitskaya, etc., 1962, 1964, 1967; Rassokho, etc., 1967). Aeromagnetic photographing gave idea about the character of the magnetic anomalies of Lomonosov ridge/spine for the elongation/extent of several hundred kilometers: from the polar region to shelf of the East Siberian Sea north Novosibirsk islands.

Aeromagnetic photographing of the modulus/module of the vector of geomagnetic field and its anomalous increases carried systematic character and it was carried out through the network/grid of the parallel profiles, oriented transversely of the course/strike of ridge/spine. Magnetic measurements were conducted with the aid of the ferroprobe aerial magnetometers of the type AM-13 and

proton-precession magnetometer-attachments. The use/application of radio-geodetic means of the determination of the coordinates of surveying aircraft ensured the joining of surveying routes on the larger part of the area with the error, which does not exceed the first kilometers. The account of variations in the geomagnetic field was realized with the aid of the magnetovariation stations, placed on drifting ice and islands of Arctic Ocean (Karasik, Rubinchik, 1964). The root-mean-square field error, calculated according to the points of intersection of Privates and secants of routes, on exceeds 30γ; however the accuracy of the measurement of increases in the anomalous field considerably above approacnes 10-15γ. The materials of photographings, carried out in different years, were used for mapping of magnetic anomalies $(\Delta T)_a$ of the ridge/spine of Lomonosov and contiguous regions of Arctic Ocean (Fig. 1). Normal field during mapping was excluded according to the data of most aeromagnetic photographing.

The analysis of the structure of anomalous magnetic field and its quantitative interpretation make it possible to substantially refine representations about the deep structure of Lomonosov ridge/spine and his interrelations with the structures of the adjacent regions of the bottom of Arctic Ocean. Moreover, the interpretation anomalous magnetic field has large value during the study of genesis and nature of Lomonosov ridge/spine.

Analysis of the structure of anomalous magnetic field.

The studied part of Lomonosov ridge/spine from the west borders on Amundsen's deep-water basin, which is the part of the Eurasian basin, and from the east - with the deep-water basins of Makarov and Podvodnikov, which relate to the Amerasian basin (Fig. 2) of Arctic Ocean (Treshnikov, etc., 1967). From the south Lomonosov ridge/spine is isolated by downwarp/trough from shelf of the East Siberian Sea.

The examination of the anomalous field of the ridge/spine of Lomonosov and adjacent basins testifies about the peculiarity of magnetic characteristics of ridge/spine, which gives basis/base to the isolation/liberation of the independent magnetic province (Fig. 1), to which are characteristic the following features:

1. The anomalous magnetic field of Lomonosov ridge/spine is characterized by the broad band of a change in the parameters of the anomalies of their width and amplitude, which reflects the diversity of intensity of magnetization and elements/cells of the occurrence of the sources of anomalies.

2. Anomalous magnetic field of Lomonosov ridge/spine is

anisotropic and is represented by almost exclusively elongated positive anomalies and chains/networks of anomalies. The sizes/dimensions of the long and stud bolts of anomalies are different. The orientation of anisotropic anomalies is subordinated to the course/strike of ridge/spine and almost in all without exception/elimination the cases it demonstrates the close connection of the course/strike of sources of field and morphostructure of ridge/spine.

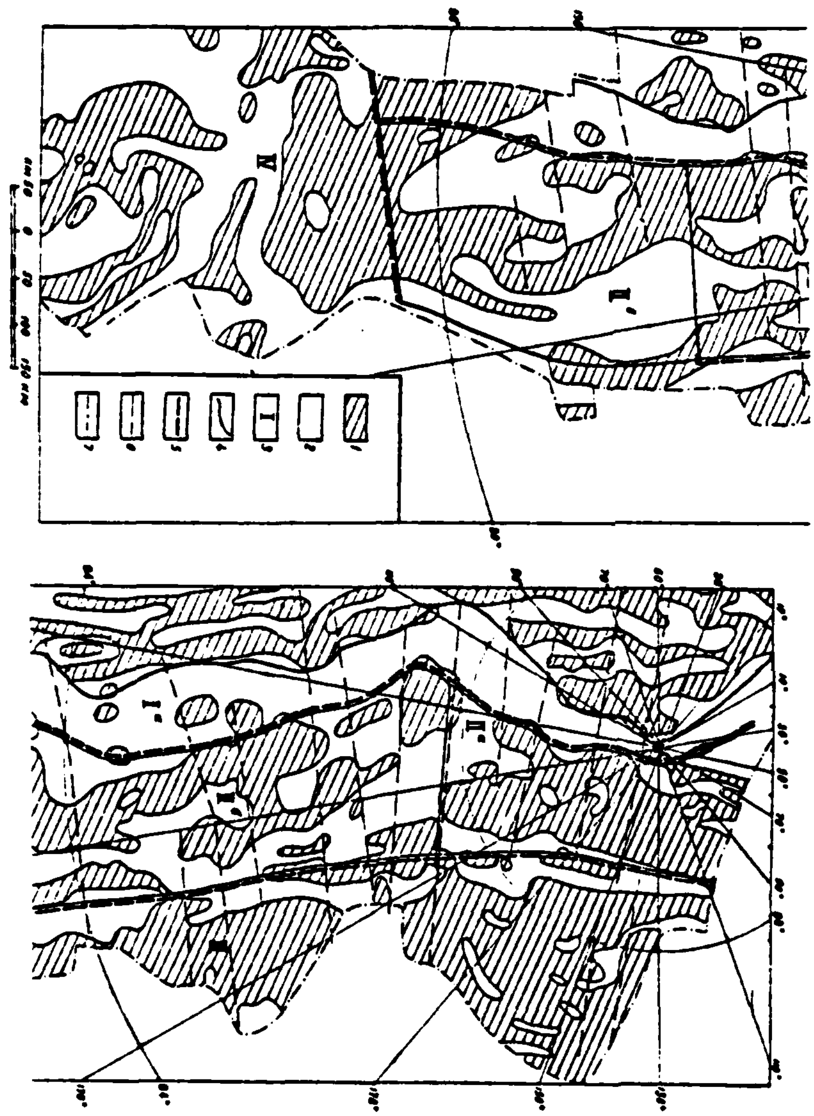

Fig. 1. Map/chart/card of zoning of ridge/spine of Lomonosov and adjacent water areas according to character of anomalous magnetic field $(\Delta T)_a$ 1 - $(\Delta T)_a>0$; 2 - $(\Delta T)_a<0$; 3 - magnetic provinces and zones: I - province of Eurasian basin, Ia - the limb zone, II - province of

Lomonosov ridge/spine, IIa - polar zone, IIb - central zone, IIC - southern zone, III - province of trough of Makarov and Podvodnikov; IV - province of Eastern Siberian shelf. 4 - boundary of magnetic provinces and zones; 5 - predicted faults on the boundary of regions with different types of the earth's crust; 6 - predicted faults, isolated on the basis of the transverse disturbances/breakdowns of the structure of anomalous field; 7 - boundary of water area, examined in this work.

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3. Anomalous magnetic field of Lomonosov ridge/spine alternating, but negative anomalies seem to form background for more clearly expressed positive anomalies; therefore in this case there is no need for resorting to assumption about existence of conversely magnetized bodies in contrast to regions of mid-Oceanian ridges/spines.

4. Anomalous magnetic field of Lomonosov ridge/spine is disrupted by system of transversely oriented elements of structure of field. They are represented either by cols between the separate maximums or closings/shortings of the outlines of separate anomalies, confined in the transverse lines which in a number of cases are outlined also beyond the limits of Lomonosov ridge/spine. Transverse

disturbances/breakdowns most probably are the faults, not healed by highly magnetic species/rocks and the dividing separate blocks/modules/units of crust. On the basis of signs/criteria the anomalous field of Lomonosov ridge/spine cannot be referred to the oceanic type and it rather detects the features of resemblance to the field of mainland regions.

From the linear, rhythmic, regulated anomalies of the basin of Amundsen (Karasik, 1968) the magnetic field of Lomonosov ridge/spine differs in terms of its morphology: on the ridge/spine the field is considerably less uniform, is less regular. Width and amplitude of anomalies change within wider limits, positive and negative anomalies have essentially different appearance.

From the complicated, very intense anomalies of the western periphery of the Amerasian basin the magnetic field of Lomonosov ridge/spine differs both in morphology, and especially by intensity. A sharp increase in the intensity of anomalies upon transfer from Lomonosov ridge/spine to Makarov basins and Podvodnikov is one of the brightest special features/peculiarities of the magnetic characteristic of Arctic basin as a whole and indicates the strong contrast in the magnetizability of the species/rocks, component/term Eurasian basin and Lomonosov ridge/spine on the one hand and Amerasian basin - on the other hand.

The border between the magnetic provinces of the basin of Amundsen and Lomonosov ridge/spine passes along the eastern side of the zone of the lowered/reduced values of anomalous field. This zone which is morphologically confined to the eastern periphery of Amundsen basin, forms the part of the magnetic province of Eurasian basin, which belongs to the mid-Oceanian type (Karasik, 1968). In the polar part the mentioned limb zone is outlined with difficulty and perhaps it degenerates.

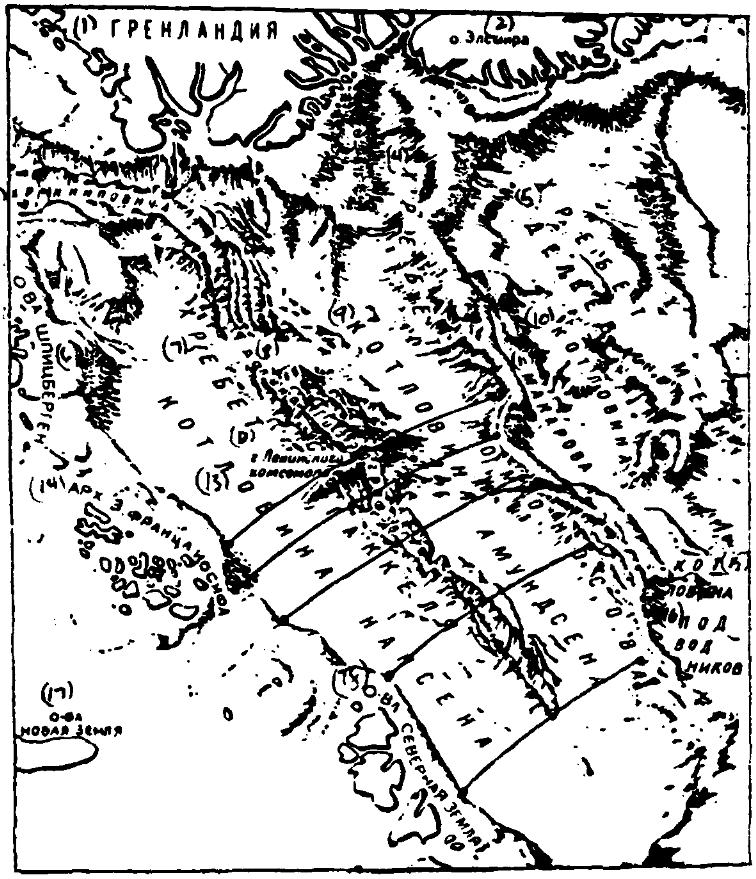

Fig. 2. Fragment of the physiographic diagram of Arctic Ocean with the preliminary position of conjugate points and trajectories of their motion.

Key: (1). Greenland. (2) the Is. of Ellesmere. (3). Khraknipovich. (4). Ridge/spine of Lomcnosov. (5). Mendeleyev ridge/spine. (6). Is. Spitsbergen. (7). Ridge/spine of Gakkel'. (8). Valley of Gidrografov. (9). Amundsen basin. (10). Basin. (11). Makarova. (12). Leninskiy

komsomol. (13). Nansen Trough of Nansen. (14). Arch. of Franz-Joseph. (15). Basin. (16). Submariners. (17). Is. new earth/ground. (18). Is. Severnaya Zemlya.

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The border between the magnetic provinces of the ridge/spine of Lomonosov, Makarov basins and Podvodnikov forms the narrow linear zone of anomalies, either which passes directly to the east from the foot of ridge/spine or deflecting from it into the depth of basins. Zone has a width from 20 to 60 km and is represented either by the negative anomaly of simple or complex form or by positive anomaly with deep edge/boundary minimums.

Transition from the southern part of Lomonosov ridge/spine to shelf is accompanied by the rearrangement of the structure of field, by a change in appearance and course/strike of anomalies. For solving the question about the continuation of the magnetic province of Lomonosov ridge/spine for the north pole, to the side of Canadian Arctic archipelago, are required supplementary materials.

Forming united magnetic province according to the sign/criterion of difference from the surrounding regions, the anomalies of Lomonosov ridge/spine do not possess homogenous structure for the

elongation/extent of his entire studied part. .. different regions of ridge/spine are characteristic the specific special features/peculiarities which become apparent in a change in the character of anomalies in the course/strike of ridge/spine. Being based on width and intensity of anomalies, it is possible to divide the magnetic province of ridge/spine into three zones (region): polar, central and southern (Fig. 1).

Boundary 87°40' N by approximately separates/liberates the intense predominantly positive anomalies of polar regions from considerably the weaker anomalies of central region. The boundary, which passes on 82°40' N, separates/liberates the central region from south, in which virtually completely are absent the short-term anomalies, characteristic to central region. The southern boundary of southern region coincides with the southern border of the magnetic province of ridge/spine as a whole.

The presence of the noticeably distinguished zones of anomalous magnetic field testifies about the essential heterogeneity of the magnetically active layer of Lomonosov ridge/spine, which reflects major differences in his geological structure.

Quantitative interpretation.

The calculation of the elements/cells of the occurrence of the magnetized bodies - the sources of anomalies was conducted by the method of half-tangents - one of the versions of the method of tangents (Pyatnitskiy, Yaroslavtseva, 1962). In this case it was assumed that the sources of anomalies were represented by the vertical layers, infinite on the course/strike and with vertical extent 1, which doubly exceeds the depth of occurrence h:

$$l' = \frac{l}{h} = 2,0$$

The depth of the occurrence of lower edges was determined using S. S. Ivanov's method (1969). This method made it possible to evaluate the order of the vertical extent of magnetized bodies l_3^1, since it gives the possibility to calculate also the depth of upper edge. 78 determinations of the empirical given vertical power/thickness of the magnetized bodies from S. S. Ivanov's method (minus several strong ejections) became average/mean value $l_3' = 2,1$ at extremes of 0.9 and of 3.3. The obtained result confirms the correctness of the a priori assumption about the power/thickness of the magnetized bodies, accepted during calculations by the method of half-tangents, and at the same time it makes it possible to evaluate the order of the theoretical errors, which appear as a result of a difference in the empirical given vertical power/thicknesses from the value of 2.0 accepted.

Using the tables of V. K. Pyatnitskiy's coefficients, we find

the values of the relative errors in determination of the depth of the occurrence of upper edge h, horizontal power/thickness 2b and surplus intensity of magnetization J for most frequently encountered during calculations values of 2b (see the Table).

Relative errors in determination of the parameters of the magnetized bodies.

l'	δ h%		δ b %		δ J%	
	от	до	от	до	от	до
0,9	+6	+8	-38	-4	+22	+4I
2,I			+8	+I	-I	-2
3,3	-7	-2	+9	+4	-8	-8

Note. Positive sign indicates for the overestimate of the designed parameter, sign "minus" - to the understating.

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Since the inaccurate selection of vertical extent is one of the basic sources of errors during the determination of the parameters of the magnetized bodies, the given table indicates the relatively high theoretical accuracy of the carried out calculations of depths, but considerably the rougher determination of horizontal power/thickness and intensity of magnetization.

The real accuracy of calculations it goes without saying lower than theoretical, since, besides the selection of vertical extent, it affect other sources of errors. Obviously, most strong factor is a priori assumption about the identical shape of the magnetized bodies on entire section/cut and all over area of Lomonosov ridge/spine. The given above short description of the anomalous field of ridge/spine unconditionally testifies about the geological diversity of the sources of anomalies. In view of this the standardized and mass quantitative interpretation of the anomalies of this complicated magnetic province as province of Lomonosov ridge/spine, is unavoidably conjugated/combined with the large errors, which forces to consider its results as first approximation to geological reality. This limitedness is characteristic to all cases of the application/appendix of one method to the interpretation of different ones in the magnetometric and, consequently, also in the geological sense of regions (Wolf, etc., 1970, Wolf, Ivanov, 1970).

On Lomonosov ridge/spine and in the adjacent basins were carried out 890 calculations h and 2b and 721 calculations J whose results were subjected to statistical processing.

The examination of the curves of distribution h the ridge/spine of Lomonosov (Fig. 3) indicates, first of all, to the considerable thickness of magnetically active layer which taking into account the

depth of lower edges must substantially exceed 15-20 km. In all three regions of Lomonosov ridge/spine magnetically active layer is differentiated in the depth.

Promising on the configuration of variation curves, it is possible to speak about the presence in all zones of the ridge/spine of three magnetic horizons/levels, developed, however, to different degree. Thus, in the polar and central regions the bodies of the third horizon/level are represented relatively weakly, whereas in the southern zone are weakly developed the bodies of the first horizon/level. It is obvious, is possible another correlation of maximums and complications of variation curves. In the absence of the independent data about the nature of the separate horizons/levels in different regions it is logical to accept the single three-layered structure of magnetically active layer on Lomonosov's entire ridge/spine.

The enlistment of the data about the calculated intensity of magnetization of species/rocks and horizontal power/thickness of bodies does not explain a question about the nature of different horizons/levels, since distribution of both parameters proves to be insufficient to those differentiated in the plan/layout and in the depth. Distribution 1 (Fig. 4) testifies about the increased intensity of magnetization of species/rocks in the polar region. If

the species/rocks of central and southern regions on the calculated intensity of magnetization belong to the class of moderately magnetic, then in the polar region can be encountered highly magnetic species/rocks. The at the same time the horizontal differentiability of species/rocks is insignificant, although is observed the tendency toward an increase in the magnetizability with the depth. The distribution of the magnetized bodies according to the horizontal power/thickness (Fig. 5) proves to be similar in all regions of ridge/spine and at all depths.

The surface of upper layer because of a large quantity of calculated depths, which relate to it, can be described most completely. Is noted a considerable drop/jump in the depths of the upper level, from less than 2 km to more than 5 km, moreover the area of the development of the upper level is considerably lower than the area of ridge/spine itself. If in the polar region the surface sources of anomalies are present almost everywhere, then in the central region they are concentrated only in the eastern half area, and in the southern region almost completely they disappear. The upper level is most elevated in the center section.

The comparison of the depth of the surface of the first horizon/level of magnetically active layer with newest bathimetric data testifies about the approximation/approach of the sources of

anomalies to a surface of the bottom in the zone of small depths.

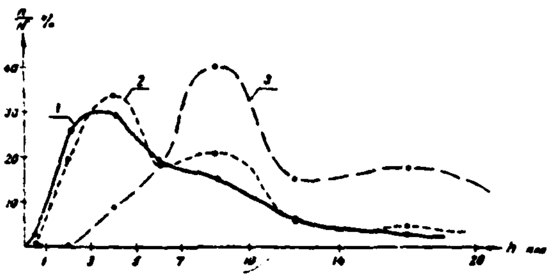

Fig. 3. The distribution curves of the calculated depths of the upper edges of the magnetized bodies of Lomonosov ridge/spine. 1 - polar zone (N=156). 2 - central zone (N=161), 3 - southern zone (N=33).

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The geological value of established facts is found in direct dependence on the joining of the chosen magnetic horizons/levels to those or other interfaces in the upper shell of the Earth. Are up to now published only the three generalized seismic columns of the upper part of the earth's crust of the ridge/spine of Lomonosov and western part of shelf of the East Siberian Sea (Demenitskaya and Kiselev, 1968). The bottom of "basaltic" layer on the published columns is not separated/liberated; however, according to seismic data the thickness of the earth's crust on Lomonosov ridge/spine is 15-18 km (Demenitskaya, etc., 1964). During the comparison of these columns with the generalized section/cut of the magnetically active layer

which is comprised according to all data, which relate to Lomonosov ridge/spine and adjacent shelf (Fig. 6), is planned conformity in the depths of the seismic and magnetic boundaries: the first magnetic horizon/level and roofing of plicated basis/base, second horizon/level and roofing of "granite" layer, third horizon/level and roofing of "basaltic" layer. If we accept the correlation indicated and to turn to the calculated depths of the occurrence of the second and third magnetic horizons/levels on Lomonosov ridge/spine, then will be outlined greater than according to seismic data, thickness of the Earth's crust on the ridge/spine. This contradiction testifies either about the limited value of the published seismic columns or about the unacceptability of the discussed correlation, or finally about the systematic overestimate of the calculated depths of the magnetized bodies. However, it should be noted that in the best conformity with magnetometric data is located the thickness of the Earth's crust, calculated using the method of the "averaged graphs/curves" (Demenitskaya, 1958) and shown on the tectonic map/chart/card of the polar regions of the Earth (1971).

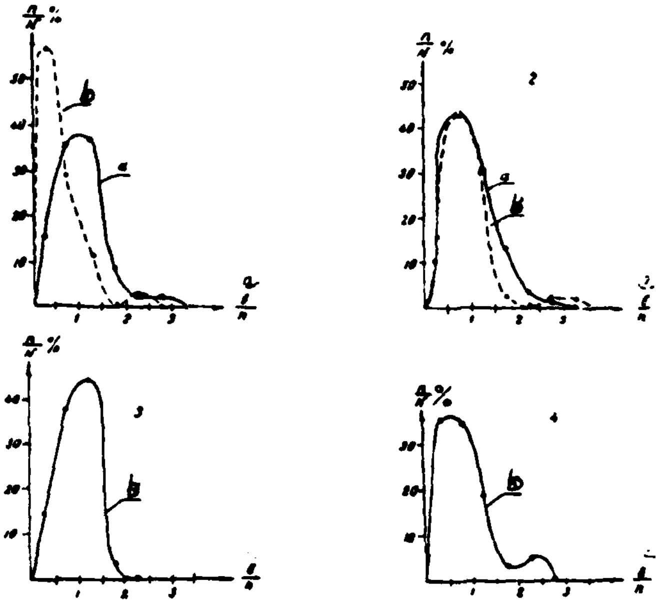

Fig. 4. The distribution curves of the horizontal power/thickness of the magnetized bodies on Lomonosov ridge/spine. 1 - polar zone, 2 - central zone, 3 - southern zone, 4 - ridge/spine as a whole, a - the first horizon/level, b - the second level, c - third horizon/level.

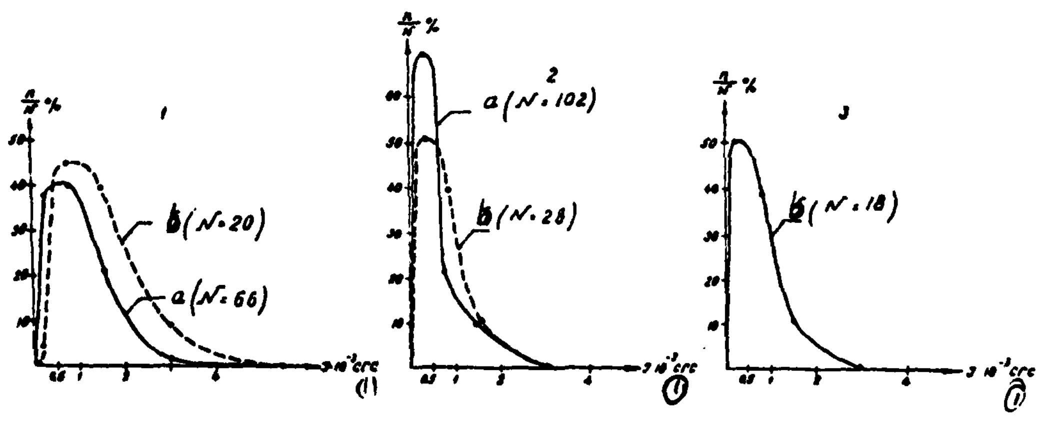

Fig. 5. Distribution curves of calculated intensity of magnetization of sources of anomalies of Lomonosov ridge/spine. 1 - polar zone, 2 - central zone, 3 - southern zone, a - the first horizon/level, b - the second horizon/level.

Key: (1) cgs.

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Irrespectively of the selection of the concrete/specific/actual version of the correlation of seismic and magnetic interfaces data of both methods indicate the mainland nature of crust on Lomonosov ridge/spine. Magnetically active layer on the ridge/spine is saturated by the sources of the anomalies of approximately identical magnetizability on entire powerful/thick section/cut and in this respect in principle differs from mid-Oceanian type magnetically active layer in which the inversion sequence of the magnetized bodies with the power/thickness, determined by the first kilometers, virtually completely exhausts the totality of the sources, which call the observed symmetrical and regular anomalies (Vine, 1966; Karasik, 1971). Furthermore, the anomalous field of Lomonosov ridge/spine does not relate to the mid-Oceanian type and according to its morphological signs/criteria. These special features/peculiarities of magnetic field, just as other geophysical and geomorphological

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characteristics of ridge/spine, are in contradiction with the voiced in different time assumptions about its median nature (Leont'yev, 1963; Liubimov, 1968).

Eurasian basin is placed in the category of "normal" oceanic basins/depressions with the median ridge/spine (Demenitskaya, Karasik, 1966; Karasik, 1968), and Amundsen basin has oceanic type crust (Demenitskaya, etc., 1967). In all probability, oceanic nature have also Makarov basins and Podvodnikov (Demeintskaya, etc., 1964; Kutshale, 1966).

Thus, Lomonosov ridge/spine is separated/liberated among the surrounding structures of the deep-water bed of Arctic basin not only morphologically, but also on the basis of the type of the earth's crust. Therefore the borders of the magnetic provinces of the ridge/spine of Lomonosov and adjacent basins can be treated as deep faults (Fig. 1). The predicted fault, which separates/liberates Lomonosov ridge/spine from Amundsen basin, is not accompanied by any specific anomalies which would indicate the presence of highly magnetic species/rocks. The predicted fault on the boundary of ridge/spine and Makarov basins and Podvodnikov is carried out along the axis the mentioned above specific zone whose magnetometric characteristic can indicate the presence of highly magnetic species/rocks in the individual parts of the fault.

Another nature have the numerous transversely oriented faults, developed on Lomonosov's very ridge/spine. Dividing the individual sections of uniform crust, they indicate its block structure. Magnatic field does not contain straight/direct information about the vertical motions of ridge/spine as a whole, but he indicates the presence of the differential motions of separate blocks/modules/units. Is observed general/common/total tendency toward weakening of the magnetometric manifestations of tectonic-magmatic activity southwards. The boundary of Lomonosov ridge/spine with shelf carries most likely disjunctive character, the predicted fault divides geologically essentially different provinces.

Judging by the calculated intensity of magnetization of species/rocks, magmatism on Lomonosov ridge/spine could have acid and intermediate and to a lesser degree basic composition, moreover basic magmatism most probably was revealed in the polar part. The magnetometric signs/criteria of the presence of the ultrabasic rocks was not revealed.

Since by the conducted geophysical investigations is established/installed the uniqueness of the structure of Lomonosov ridge/spine in the part of the Arctic basin in question, arises the

question about the reasons for the appearance of a fragment of mainland crust among the typically oceanic structures.

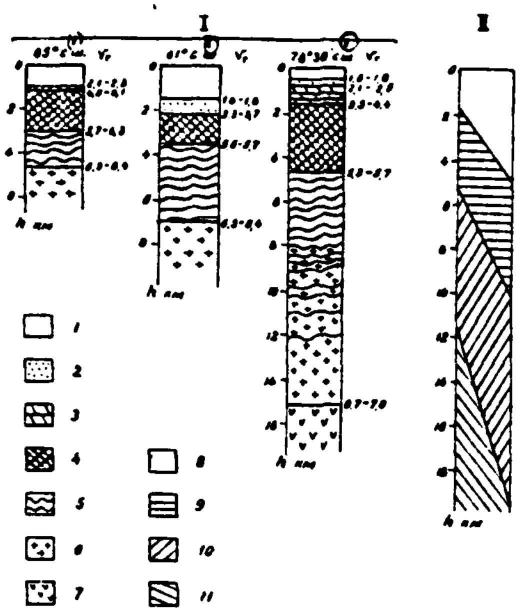

Fig. 6. The structure of the earth's crust of Lomonosov I - ridge/spine the generalized seismic columns (Demenitskaya, Kiselev, 1968): 1 - water, 2, 3 - precipitation of the first structural stage/floor, 4 - pracipitation of the second structural stage/floor, 5 - plicated basis/base, 6 - "granite" or changed "basaltic" layer, 7 - "basaltic "layer, v_r - the boundary speed in km/s. II - generalized section/cut of the magnetically active layer: 8 - nonmagnetic thickness, 9 - the first layer, 10 - second layer, 11 - third layer.

Key: (1) N.

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To a quastion about the genesis of Lomonosov ridge/spine.

The presence in center of the oceanic Arctic basin of aseismic underwater ridge with the mainland or sub-mainland crust which is oriented roughly in parallel to the axis of underwater ridges of Gakkal' and Mendeleyev-alpha, did not yield to explanation until as realized the decisive role of the horizontal motions of the platforms/plates of lithosphere in the formation/education of oceanic basins/depressions and in the contemporary distribution of mainland masses on the earth's surface (Mackenzie, Parker 1967; Morgan, 1968; Le Pichon, 1968). From the positions of tectonics of lithospheric platforms/plates the genesis of Lomonosov ridge/spine finds simple and logical explanation.

The analysis of the structure of the anomalous magnetic field of Eurasian basin led to the conclusion about its emergence as a result of the growth of the oceanic bottom from the axis of the ridge/spine of Gakkel' (Karasik, 1968). This conclusion is in accordance with the previous assumptions about the disclosure/expansion of Eurasian basin, based on the data about its relief (Kheizen, Ewing, 1964), the seismicity (Sykes, 1965) and on the general geological prerequisites/premises (Wilson, 1963; Harland, 1967).

From the fact of the disclosure/expansion of Eurasian basin it follows that the fragment of mainland crust, the now forming ridge/spine of Lomonosov, prior to the beginning of the separation of platforms/plates were located in the straight/direct contact with outskirts of Eurasian continent and formed its part (Johnson, Heezen, 1967, Ostenso, Wold, 1967). Consequently, by its present position among the Arctic basin Lomonosov ridge/spine is obliged to the build-up/growth of lithospheric platform/plate from the side of Eurasian basin by the inclusion into its composition of Amundsen's oceanic basin with its gradually increasing area.

In favor of this testify also morphological data. Opposite of the edge of Eurasian basin, formed by Kara-Barents Sea continental slope and the western slope of Lomonosov ridge/spine, strike with the resemblance of their configurations (Fig. 2). The degree of resemblance can be evaluated quantitatively during the comparison of the configuration of similar isobaths. The preliminary morphometric analysis, based on the simple rotations and the parallel translations of similar bathimetric outlines, for isobaths 1, 2, 3 km from the side of slope and isobath 2 km on Lomonosov ridge/spine gave root-mean-square disagreement not more than 10 km with the distance between the compared outlines to 700 km. The same result

constantly/invariably was obtained during the comparison of the isobaths indicated with the axis of of Gakkel' ridge/spine.

If Lomonosov ridge/spine once was located in the contact with Kara-Barents Sea shelf, then its anomalous magnetic field or at least its that part whose sources lie/rest at the foundation, must detect the features of resemblance to the field of shelf of Eurasia. The degree of resemblance will be the less, than more individual was development of both regions both in the stage, which preceded splitting off, and after it.

A strict comparison of anomalous magnetic fields of the now divided regions of the bottom is possible only after the reconstruction of their predrift position, for which it is necessary to know the coordinates of the pole of disclosure/expansion (Bullard A O, 1965). At present only the possible approximate comparison of the character of anomalous field in the regions, which prove to be in the contact with each other as a result of closing/shorting the Eurasian basin on the characteristic elements/cells of the configuration of continental slope and slope of the ridge/spine of Lomonosov (Fig. 2). An example of this obvious conformity is the projection of shelf to the north from the Earth of Franz-Joseph and the polar curvature of Lomonosov ridge/spine.

In the limits of outskirts of the mainland shelf, located opposite the studied part of Lomonosov ridge/spine, are separated/liberated three different in the character the zones of the anomalous field: the Earth Franz-Joseph, shelf of the Kara Sea and northern Earth. In shelf to Franz-Joseph's north from Earth are developed the intense positive anomalies of the northwestern course/strike which after the reconstruction of the predrift position prove to be equally oriented with the intense positive anomalies of the highest latitude region of the polar part of the ridge/spine. Conformity is detected not only in the course/strike, but also in intensity and width of anomalies.

To holy Anna's trench with its inexpressive slightly anomalous field, connected with the deep sources, corresponds on the ridge/spine the section of the sharp reduction of the amplitude of anomalies and deep subsidence of the upper level of magnetically active layer in the southern part of the polar zone. The weak elongated anomalies of shelf between the trench of holy Anna and the northern Earth answer analogous appearance the anomalies of the central zone of Lomonosov ridge/spine. Finally, relatively intense subparallel to shelf anomalies to the east from the islands of the northern Earth find analogy in the anomalies of enhanced intensity, characteristic to the southern zone of Lomonosov ridge/spine.

As a whole the described reconstruction, in spite of its preliminary and approximate character, convincingly it testifies in favor of the resemblance of the geological structure of shelf of Kara Sea and Lomonosov ridge/spine. Consequently, the comparison of the anomalous magnetic fields of the reconstructed regions comes forward in the role of important criterion during testing of the hypothesis of mainland drift as this for the first time, but on the less vast material it was shown for Atlantic Ocean (Strangway, Vogt, 1969). Under conditions of Arctic Ocean in which all islands are located in the limits of shelf and completely they are absent from the deep-water part, the reconstruction of the predrift position of separate mainland blocks/modules/units and a comparative analysis of anomalous field on their basis proves to be the especially effective means of the explanation of the geological structure of the fragments of mainland crust, forgotten/lost in the center of oceanic Arctic basin.

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In connection with Lomonosov ridge/spine this means that it can be considered as the part of Britain-Arctic province in the same measure, in which this is correct in the relation to the Earth Franz-Joseph, northern Earth and their dividing shelf. From these positions become completely clear regional special

features/peculiarities examined above of the individual parts of the magnetic province of Lomonosov ridge/spine.

According to Yu. G. Kiselev's data, Lomonosov ridge/spine in the long history of its development survived subaerial period. Completely it is possible to assume that prior to the beginning of splitting off from Eurasia and after certain time after it the fragment of mainland crust - Lomonosov's ridge/spine - could be located higher than sea level. The subsidence of ridge/spine is logical to connect with two nonsimultaneous processes: with elongation and thinning of the crusts in outskirts of Eurasia, which preceded the formation of the axis of growth, and with the subsequent subsidence of oceanic lithosphere in proportion to its removal/distance from the axis of growth. In the latter case should be allowed the presence of permanent mechanical connection/communication on the contact between the oceanic basin of Amundsen and the mainland block/module/unit of Lomonosov ridge/spine, and this in turn, means that their dividing fault, if the same exists, had to lose activity soon after its emergence. The available data about the underwater outskirts of continents in the North Atlantic testify in favor of the existence of mechanical connection/communication on the contact of the oceanic and mainland lithosphere of single platform/plate (Rona, 1970).

Judging by the contemporary distribution of seismicity (Sykes,

1965), in the Arctic basin do not exist other active boundaries between the lithospheric platforms/plates, except the axis of growth in the Eurasian basin. This fact advances the problem of the demarcation of North American and Eurasian lithospheric platforms/plates. Resolution of this problem is closely related with the continental riffled system in Arctic (Grachev, etc., 1971). However, whatever the contemporary position of the boundaries between the mentioned lithospheric platforms/plates, there is reason to believe that in the geological past they could be others. Obtained in recent years data (Hall, 1971) brought new arguments in favor of hypothasis about the median nature of Mendeleyev-alpha ridge/spine, which in the geological past was the axis of growth, but then it lost activity (Johnson, Heezen, 1967; Ostenso, Wold, 1967; Demenitskaya, Karasik, 1969; Vogt, Ostenso, 1970). If this hypothesis is correct, that at present it cannot be taken for granted, then special importance acquires a question about the relationship/ratio of the periods of the activity of growth relative to the axes of the ridge/spine of Mendeleyev-alpha and ridge/spine. Accepting the point of view of Voigt, etc. (Vogt A O, 1970) about the abrupt migration of the axis of growth from the east to the west, it is possible to arrive at the conclusion about the passive role of Lomonosov ridge/spine. However, it is not possible to exclude the possibility of the partial overlap of the periods of growth from the different axes; in this case Lomonosov ridge/spine had to assume the

role of the boundary structure, which was being located on the boundary of two platforms/plates of the lithosphere whose directions were roughly opposite. Under such conditions the structure of ridge/spine could undergo the effect of the processes, which act on the boundary of adjacent platforms/plates. The given above data about the anomalous magnetic field of Lomonosov ridge/spine and his resemblance to the field of shelf indicate faster the absence of this effect and, therefore, on the abrupt migration of the axes of growth, which eliminates the simultaneity of disclosure/expansion in the Amerasian and Eurasian basins.

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